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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/624,913	07/22/2003	Jochen Franzen	B0004/7110	7106

21127 7590 08/13/2004

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EXAMINER	
LEYBOURNE, JAMES J	

ART UNIT	PAPER NUMBER
2881	

DATE MAILED: 08/13/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/624,913	FRANZEN, JOCHEN	
	Examiner	Art Unit	
	James J. Leybourne	2881	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-47 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-15,18,20,22-34,36 and 37 is/are rejected.

7)☒ Claim(s) 16, 17, 19, 21 and 35 is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on 22 July 2003 is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date 2/12/200&2/25/2004.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1-4, 11, 13, 14, 22-26, 33 and 37 are rejected under 35 U.S.C. 103(a) as being unpatentable over Clemmer (US 20040094702) in view of Lee et al. (USPN 6586732).

Regarding claims 1, 11, 22, 23, 33 and 37, In Fig. 4, Clemmer discloses a hybrid ion mobility and time-of-flight mass spectrometer instrument **30** that includes, as its basic components, an ion source region **32** in communication with an ion mobility spectrometer **34**, which itself is in communication with a mass spectrometer **36** [0057]. The instrument includes an ion source coupled to at least a first ion mobility spectrometer having an ion outlet coupled to a mass spectrometer and providing for passage to the mass spectrometer only ions defining a preselected ion mobility range. The ion mobility spectrometer can use electronically controllable inlet and outlet gates to allow passage of ions in a preselected ion mobility range (Abstract). Clemmer teaches that a wire grid can be used as a gating electrode [0064].

Ion mobility spectrometer (IMS) **34** includes a drift tube **40** having a gas port **42** disposed adjacent to an ion exit end **44** of tube **40**, wherein port **42** is connected to a source of buffer gas [0059]. This provides a gas flow in opposition to the ion travel.

Clemmer does not teach use of an ion generator that generates an ionization cloud containing ions at atmospheric pressure, use of an electrospray apparatus with a capillary and strong electric field, and the method of establishing the electric field in the IMS drift tube.

In Fig. 1, Lee et al. disclose an ion mobility spectrometer in which a plume of ions and solvent is electrosprayed into a desolvation region, and ions are propelled from the desolvation region through the drift tube (Abstract). The ion injection spray tip **38** includes a fused silica capillary **40** (FIG. 2) held by a conductive metal union **42**. A dc power supply **44** applies a high voltage, preferably about 20 kV, to the union **42** (column 4, lines 4-10).

As seen in FIG. 2, the body [drift tube] **46** is a right circular cylinder made up of several conductive stainless steel rings **54** [electrodes] separated by insulating ceramic spacers to generate the electric field in the IMS drift tube **56** (column 4, lines 33-36). Lee teaches another way to provide electric field is to use a ceramic or similar body with its interior coated with a thick film resistor (column 4, lines 55-59).

Regarding claims 2-4, 25 and 26, as admitted in the specification [0003], the methods of electrospraying and pneumatic spraying through concentric capillaries is known in the art.

It would be obvious to one of ordinary skill in the art to use an ion source operated at atmospheric pressure as the source for an IMS/MS as disclosed by Clemmer because Lee et al. teach that in ion mobility spectrometry, typically, ions are created at atmospheric pressure and gated through a drift tube (column 1, lines 41-43).

3. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Clemmer in view of Lee et al. as applied to claims 1 and 23 and in further view of Laiko et al. (USPN 5965884). Use of a pulsed laser to form an ionization cloud by laser desorption in not taught by Clemmer or Lee et al.

Laiko et al. disclose an atmospheric pressure matrix assisted laser desorption source that can interface spectrometers. In cases when the ionization process is conducted in ambient air, the use of an ionization chamber is optional (column 2, lines 65-58). It would be obvious to one of ordinary skill in the art to use the atmospheric pressure matrix assisted laser desorption source of Laiko et al. as the source for the IMS in the hybrid system of Clemmer because Laiko et al. teach advantages of MALDI include simplicity of probe preparation, stability and high tolerance to sample contamination (column 1, lines 57-60).

4. Claims 12 and 34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Clemmer in view of Lee et al. as applied to claims 1 and 23 and in further view of Vora et al. (USPN 4712008). Neither Clemmer nor Lee et al. teach heating the gas used in a drift tube of an IMS prior to introducing it into the drift tube.

Vora et al. disclose an ion mobility spectrometer comprising a chamber for heating drift gas prior to entry into the drift region. It would be obvious to one of ordinary skill in the art to use preheat the gas used in the drift tube because Vora et al. teach this will enhance the uniformity of ion drift mobility times (Abstract).

5. Claims 6-10, 27-32 and 36 are rejected under 35 U.S.C. 103(a) as being unpatentable over Clemmer in view of Lee et al. as applied to claims 1 and 23 and in further view of Kunz (USPN 6239428). Neither Clemmer nor Lee et al. teach using electron emission ionizers, beta particle emitting radioactive species ionizers, corona discharge ionizers or photoionization.

Kunz discloses using proton affinity ionization and electron transfer ionization as ion sources for an IMS. By mixing the target compound and an intermediate compound they can be exposed to an ionizer. Examples of such ionizers are electron emission ionizers, beta particle emitting radioactive species, corona discharge ionizers and photon emitting sources, such as lasers or lamps. The gas mixture containing the target compound and the intermediate compound interacts with ionizer **230** which ionizes the intermediate compound. The ionized intermediate compound, in turn, interacts with and ionizes the target compound by proton transfer (Fig. 3 and column 7, lines 6-24).

It would be obvious to one of ordinary skill in the art to use a proton affinity ionization sources for the IMS in the hybrid system of Clemmer because Kunz teaches proton affinity ionization and electron transfer ionization provide enhanced detection sensitivity and/or detection selectivity for certain target compounds (Abstract).

6. Claims 15 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Clemmer in view of Lee et al. as applied to claims 1 and 23 and in further view of Whitehouse (US 20020175278). Clemmer and Lee et al. do not teach using an ion drift tube that is conical in shape or using a funnel shape for the entrance opening for a mass spectrometer.

Whitehouse teaches that an ion funnel can be used as a drift tube in an IMS. Ions produced by MALDI operated at atmospheric pressures experience ion to neutral gas collisions as they are transported in an ion guide or ion funnel in the presence of RF electric fields. It would be obvious to one of ordinary skill in the art to use an ion funnel as both the drift tube and the inlet to the mass spectrometer in the hybrid system of Clemmer because Whitehouse teaches ion mobility and mass to charge can be performed in the an ion funnel devices while transporting and focusing ions and the gas collisions serve to damp the ion trajectories toward the ion centerline, improving ion transport efficiency into and through vacuum (Abstract).

7. Claim 20 is rejected under 35 U.S.C. 103(a) as being unpatentable over Clemmer in view of Lee et al. as applied to claims 1 and 23 and in further view of Guevremont et al. (US 20030089849). Clemmer and Lee et al. do not teach using an ion drift tube with a curved shape.

In Fig. 3, Guevremont et al. discloses a high field asymmetric waveform ion mobility spectrometry with a curved drift tube and followed a mass apectrometer. When using a high field asymmetric waveform ion mobility spectrometer, it would be obvious to one of ordinary skill in the art to use a

curved drift tube as disclosed by Guevremont et al. because they teach this provides an improvement over a cylindrical drift tube design [0011].

Allowable Subject Matter

8. Claim 16, 17, 19, 21 and 35 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

9. The following is a statement of reasons for the indication of allowable subject matter:

Regarding claim 16, the prior art fails to teach or fairly suggest an IMS drift tube wherein the opening of is covered by a grid which bulges outwards.

Regarding claim 17, the prior art fails to teach or fairly suggest uses a capillary with a convex tip as the opening to a mass sspectrometer.

Regarding claim 19, although it is known to use a hot drying gas to dry the spay from a nebulizer, the prior art fails to teach or fairly suggest using an ionization gas input path through which a hot drying gas and charged particles may be admixed to the ionization cloud.

Regarding claim 21, the prior art fails to teach or fairly suggest a hybrid IMS/MS that comprises a plurality of drift tubes that are connected to one another.

10. Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance"

Relevant Prior Art

11. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

US 4855595 to Blanchard discloses an IMS wherein neutralized molecules flow with the drift gas.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to James J. Leybourne whose telephone number is (571) 272-2478. The examiner can normally be reached on M-F 9:00-6:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, John R Lee can be reached on (571) 272-2477. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Nikita Wells

NIKITA WELLS
PRIMARY EXAMINER 08/11/04

August 10, 2004

JJL